Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): A chain and sprocket drive system comprising:

a chain having a plurality of pairs of links being interconnected by pins;

one or more generally circular sprockets ~~mounted on a cam shaft~~ having a plurality of teeth spaced about their periphery, the sprocket having roots located between pairs of adjacent teeth for receiving the chain pins;

each of the roots having a root radius extending between the center of the sprocket and a point along the root closest to the sprocket center in a radial direction;

at least one of the roots having a first root radius, and at least one of the roots having a second root radius, the second root radius being less than the first root radius; and

the first and second root radii arranged in a pattern effective to redistribute tensions imparted to the chain, reducing ~~the overall~~ maximum tension forces exerted on the chain during operation of the system relative to the maximum tension forces in the system where the sprocket is a straight sprocket.

Claim 2 (Currently Amended): The chain and sprocket system according to Claim 1, wherein the sprocket operates at varying speeds and the chain tensions are redistributed to sprocket orders effective to reduce the ~~overall~~ maximum tension forces imparted to the

chain during rotation of the sprocket.

Claim 3 (Original): The chain and sprocket system according to Claim 2 wherein the root radii are arranged in a major pattern and a minor pattern.

Claim 4 (Original): The chain and sprocket drive system according to Claim 3, wherein the tensions are redistributed to have concentrated tensions at least at four times for every rotation of the sprocket.

Claim 5 (Currently Amended): The ~~That~~ chain and sprocket system according to Claim 1 wherein the root radii are arranged in a pattern that also reduces ~~reduced~~ noise produced by the interaction of said chain and [[of]] said sprocket.

Claim 6 (Currently Amended): The chain and sprocket drive system according to Claim 1 wherein external tensions are imparted to the chain from sources other than the sprocket, and the sprocket is provided with a root radii pattern effective to offset the external tensions in the chain[[,]] reducing ~~the overall~~ maximum tension forces ~~executed~~ exerted on the chain relative to maximum tension forces in the system where the sprocket is a straight sprocket.

Claim 7 (Original): The chain and sprocket drive system according to Claim 1, wherein external tensions are imparted to the chain from sources other than the sprocket,

and the sprocket is provided with a root radii pattern effective to increase the overall tensions exerted on the chain.

Claim 8 (Original): The chain and sprocket drive system according to Claim 1, wherein at least one of the roots has a third root radius, the third root radius being less than the second root radius.

Claim 9 (Original): The chain and sprocket drive system according to Claim 8, wherein the first, second, and third root radii are arranged in a pattern that substantially repeats four times around the sprocket.

Claim 10 (Currently Amended): A sprocket comprising:

a plurality of teeth disposed along a circumference of the sprocket, adjacent teeth having roots therebetween, each of the roots having a root radius defined as the distance between the center of the sprocket and a point along the root closest to the sprocket center in a radial direction~~;~~, the sprocket teeth and roots disposed to receive and engage a circular loop of chain; and

a plurality of different root radii arranged in a pattern distributing ~~effective to distribute~~ the tensions imparted to the chain [[at]] by the sprocket to one or more preselected orders relative to the rotation of the sprocket, the distributed tensions effective to offset tensions imparted to the chain by other tension sources reducing maximum tension forces exerted on the chain relative to maximum tension forces in the system

where the sprocket is a straight sprocket.

Claim 11 (Original): The sprocket according to Claim 10 wherein the root radii are arranged in a plurality of patterns, at least one of which is major pattern and at least one of which is a minor pattern.

Claim 12 (Original): The sprocket according to Claim 10 wherein the pattern of root radii also is effective to reduce the noise generated by the interaction of the sprocket and a chain.

Claim 13 (Previously Presented): The sprocket according to Claim 10 wherein a preselected order comprises a fourth order.

Claim 14 (Currently Amended): The sprocket according to Claim 10 wherein external tensions from sources other than the sprocket are imparted to the chain, and one or more of the preselected sprocket orders and the tensions distributed thereto are chosen to correspond to peaks in the external tensions effective to at least partially offset the external tensions imparted to [[in]] the chain.

Claim 15 (Original): The sprocket according to Claim 10 wherein external tensions from sources other than the sprocket are imparted to the chain, and one or more of the preselected sprocket orders are chosen to add to the external tensions in the chain.

Claim 16 (Original): The sprocket according to Claim 10 wherein the plurality of different root radii comprises at least a first root radii and a second root radii being less than the first root radii.

Claim 17 (Original): The sprocket according to Claim 16 wherein the first and second root radii are arranged in a pattern that substantially repeats four times around the sprocket.

Claim 18 (Original): The sprocket according to Claim 16 wherein the plurality of different root radii comprise a third root radii being less than the second root radii.

Claim 19 (Original): The sprocket according to Claim 18 wherein the first, second, and third root radii are arranged in a pattern that substantially repeats four times around the sprocket.

Claim 20 (Currently Amended): A method of distributing tensions imparted to a chain and sprocket system operating at variable speeds, comprising:

providing a sprocket having a plurality of teeth separated by roots;

providing each root with a root radius extending between the center of the sprocket and a point along the root closest to the sprocket center in a radial direction;

providing a plurality of different root radii; and

arranging the root radii between adjacent sprocket teeth in a pattern effective to distribute the tensions imparted to the chain and sprocket system reducing ~~the~~ maximum tension forces exerted on the chain relative to maximum tension forces in the system where the sprocket is a straight sprocket.

Claim 21 (Currently Amended): The method according to Claim 20, comprising selecting a root radii pattern effective to concentrate chain tensions at one or more predetermined sprocket orders.

Claim 22 (Original): The method according to Claim 21 wherein a plurality of root radii patterns are selected, at least one a major pattern and at least one a minor pattern.

Claim 23 (Original): A method according to Claim 21 comprising selecting the root radii pattern effective also to reduce the noise generated by the interaction of the chain with the sprocket.

Claim 24 (Original): The method according to Claim 20, comprising concentrating the tensions imparted to the chain by the sprocket at a fourth sprocket order.

Claim 25 (Original): The method according to Claim 20, comprising selecting the root radii pattern effective to at least partially offset tensions imparted to the chain by sources other than the sprocket to balance the overall tension force imparted to the system by all

tension sources.

Claim 26 (Original): A method of concentrating tensions according to Claim 20, comprising selecting the root radii pattern effective to at least partially add to tensions imparted to the chain by sources other than the sprocket to at least partially balance the overall tension force imparted to the system by all tension sources.

Claim 27 (Currently Amended): A chain and sprocket system adapted for reducing chain tensions in the system, the sprocket comprising:

means for concentrating the tensions imparted to the chain by the sprocket at one or more predetermined sprocket orders; and

means for at least partially offsetting tensions imparted to the chain by sources other than the sprocket and reducing maximum tension forces exerted on the chain relative to the maximum tension forces in the system where the sprocket is a straight sprocket.

Claim 28 (Previously Presented): The sprocket according to Claim 27, wherein the predetermined sprocket order is at least a fourth order.

Claim 29 (Currently Amended): An automotive timing system comprising:

a chain having a plurality of pairs of links being interconnected by pins; a generally circular sprocket mounted on a cam shaft having a plurality of teeth spaced about the periphery, the sprocket having roots located between pairs of adjacent teeth for receiving

the chain pins;

each of the roots having a root radius extending between the center of the sprocket and a point along the root closest to the sprocket center in a radial direction;

at least one of the roots having a first root radius, at least one of the roots having a second root radius, and at least one of the roots having a third root radius, the second root radius being less than the first root radius and the third root radius being less than the second root radius; and

the first, second, and third root radii arranged in a pattern maintaining the distance between the chain pins substantially constant while the chain is engaged around the sprocket and effective to redistribute tensions imparted to the chain ~~and reduce~~ reducing maximum tension forces exerted on the chain during operation of the system.

Claim 30 (Original): The automotive timing system according to claim 29, wherein the pattern comprises a sequence of second, third, third, second, first, second, third, third, second, first, second, third, third, second, first, second, third, third, and second root radii.

Claim 31 (Original): The automotive timing system according to Claim 24 wherein the root radii pattern is effective also to reduce the noise generated by the interaction of the chain and the sprocket.

Claim 32 (Withdrawn): A sprocket comprising:

a plurality of teeth disposed along a circumference of the sprocket, adjacent teeth

being adapted for contacting teeth of a silent chain, the sprocket having a pitch radius defined as the distance from the center of the sprocket to a center of a joint of the silent chain when a tooth of the silent chain proximate the joint is seated between adjacent teeth of the sprocket; and

a plurality of pitch radii arranged in a pattern effective to distribute the tensions imparted to the silent chain at one or more preselected orders relative to the rotation of the sprocket.

Claim 33 (New): An automotive drive system comprising:

a chain subject to tension loading sources external to the drive chain, the chain having a plurality of links, each link formed of two or more plates interconnected by pins, each pin having a central longitudinal axis, and the links providing contact surfaces;

the chain traveling in a loop about at least one sprocket in driving engagement with the chain and at least one sprocket in driven engagement with the chain, each sprocket having a central axis of rotation and plurality of surfaces spaced about the periphery of the sprocket disposed to engage the chain link contact surfaces;

the sprocket engagement surfaces spaced a distance from the sprocket central axis to position the chain at a pitch radius defined by the distance between the sprocket central axis and the pin axis of a chain link engaged by the surfaces; and

the engagement surfaces of at least one of the sprockets disposed to engage the chain at least at a first pitch radius and at least at a second pitch radius, the pitch radii arranged in a pattern imparting tensions to the chain at one or more sprocket orders

effective to reduce maximum chain tensions during operation of the system relative to maximum chain tensions of the system where the sprocket is a straight sprocket.

Claim 34 (New): The automotive drive system of Claim 33 wherein the system operates at variable speeds, the system speeds where chain tensions are generally at a maximum are the system resonance conditions; and the pattern of pitch radii are arranged to impart a maximum tension to the chain at said system resonance speeds.

Claim 35 (New): The automotive drive system of Claim 34 wherein the first pitch radius repeats in a regular pattern during the rotation of the sprocket and the second pitch radius repeats in a regular pattern during the rotation of the sprocket, the first radius spaced from the second radius with other pitch radii therebetween.

Claim 36 (New): The automotive drive system of Claim 35 wherein the engagement surfaces of each tension reducing sprocket provide a repeating pattern of pitch radii having a first, minimum pitch radius, a plurality of pitch radii increasing to a second, maximum pitch radius, and a plurality of radii decreasing to the minimum pitch radius.

Claim 37 (New): The automotive drive system of Claim 33 wherein the engagement surfaces of the tension reducing sprocket are disposed to provide a repeating, regular pattern of pitch radii effective to reduce the maximum chain tensions during operation of the system relative to a system where the sprocket engagement surfaces are disposed to

provide an irregular pattern of pitch radii.

Claim 38 (New): The automotive drive system of Claim 33 wherein the driving sprocket is rotated by an automotive powerplant at varying speeds; the powerplant operating at one or more speeds that produce substantially maximum chain tensions; and the pitch radii patterns of the tension reducing sprockets are effective to reduce said maximum chain tensions relative to maximum chain tensions in a system where the sprocket is a straight sprocket.

Claim 39 (New): The automotive drive system of Claim 38 wherein the pitch radii pattern provided by each tension reducing sprocket is effective to produce a maximum chain tension that is substantially equal to or less than the chain tension in a system where the sprocket is a straight sprocket through the normal operating speed range of the powerplant.

Claim 40 (New): An automotive drive system operable at variable speeds comprising:

a chain subject to tension loads traveling in a loop about at least one sprocket in driving engagement with the chain and at least one sprocket in driven engagement with the chain, the system operating at one or more speeds where chain tensions reach a peak relative to chain tensions at other system speeds;

the chain having a plurality of links formed of two or more plates interconnected by

pins, each pin having a central longitudinal axis and the links providing contact surfaces, each sprocket having a central axis of rotation and a plurality of surfaces spaced about their periphery disposed to engage the chain link contact surfaces; the sprocket engagement surfaces spaced a distance from the sprocket central axis to dispose the chain at a pitch radius defined by the distance between the sprocket central axis and the pin axis of a chain link engaged by the surfaces; and

the engagement surfaces of at least one of the sprockets disposed to engage the chain at a minimum pitch radius, a maximum pitch radius, and intermediate pitch radii therebetween, the engagement surfaces maintaining the distance between adjacent pin axes of links engaged with the sprocket substantially constant, and the pitch radii in a pattern imparting tensions to the chain timed with respect to tension loads imparted to the system from other sources effective to reduce maximum chain tensions at one or more of the peak tension speeds relative to the maximum chain tensions at said peak tension speeds where the sprocket is a straight sprocket.

Claim 41 (New): The automotive system of Claim 40 wherein each tension reducing sprocket engagement surfaces provide a regular, repeating pattern of minimum and maximum pitch radii around the sprocket.

Claim 42 (New): The automotive system of Claim 41 wherein each tension reducing sprocket engagement surfaces provide a pitch radii pattern where the intermediate pitch radii increase from the minimum pitch radius to the maximum pitch radius and then

decrease from the maximum pitch radius to the minimum pitch radius.

Claim 43 (New): The automotive system of Claim 42 wherein an automotive power plant rotates the driving sprocket, the automotive power plant imparting periodic tension loads on the chain, the system reaching resonance conditions at powerplant speeds where the chain tensions reach their approximate maximum, and the pattern of pitch radii and the timing of the tensions provided by the pitch radii relative to the power plant tension loads are effective to reduce maximum chain tensions during operation of the system at said resonance conditions relative to the system where the sprocket is a straight sprocket operating at resonance conditions.

Claim 44 (New): The automotive system, of Chain 42 wherein one or more cam sprockets imparts periodic tension loads on the chain, the system reaching resonance conditions at powerplant speeds where chain tensions are at their approximate maximum, and the pattern of pitch radii and the timing of the tensions provided by the pitch radii is effective to reduce maximum chain tension during operation of the system at resonance conditions relative to the system where the sprocket is a straight sprocket operated at resonance conditions.

Claim 45 (New): A tension reducing sprocket for an automotive drive system having a continuous loop chain in driving engagement with a driving sprocket and a driven sprocket, the chain formed of two or more plates interconnected by pins, each pin having a

central longitudinal axis, and the links providing contact surfaces disposed to engage the sprocket, the sprocket comprising:

a sprocket body and a central rotational axis, the sprocket body provided with engagement surfaces about its periphery, the engagement surfaces disposed to receive the chain link contact surfaces in a driving relation, the engagement surfaces spaced a distance from the sprocket central axis to position the chain link received thereon at a pitch radius defined by the distance between the sprocket central axis and the chain link pin axis; and

the engagement surfaces providing a repeating pattern of at least a first pitch radius and at least a second greater pitch radius, the pattern of the pitch radii effective to reduce maximum chain tensions during operation of the drive system relative to the system where the sprocket is a straight sprocket.

Claim 46 (New): The tension reducing sprocket of Claim 45 wherein at least the first and second pitch radii are selected and disposed to impose tension events on the chain timed with respect to torque loads imposed on the chain from other sources effective to reduce the maximum chain tensions during operation of the drive system relative to a system where the sprocket is a straight sprocket.

Claim 47 (New): The tension reducing sprocket of Claim 46 wherein the first pitch radius repeats in a regular pattern during the rotation of the sprocket and the second pitch radius repeats in a regular pattern during the rotation of the sprocket, the first radius

spaced from the second radius with other pitch radii therebetween.

Claim 48 (New): The tension reducing sprocket of Claim 45 wherein the engagement surfaces of the tension reducing sprocket are disposed to provide a repeating pattern of pitch radii having a minimum pitch radius, a plurality of pitch radii increasing to a maximum pitch radius, and a plurality radii decreasing to the minimum pitch radius.